ICI MAGAZINE

ICI MAGAZINE JANUARY 1962

Volume 40 Number 301

Contents

Contributors

Bryan Alderson spends much of his spare time keeping abreast of Finnish affairs. He is a trade representative for Birmingham Sales Office Paint Department and has been with ICI since 1957. Took a degree in economics at the University College of North Staffordshire and was in the Regular Army for three years. Apart from Finland, his interests include sailing and mountaineering.

Dr. Eusebius Holmes recently retired as a director of Plant Protection. Joined Nitram Ltd. in 1928 and from early 1931 worked continuously for ICI on crop protection matters. Was made a director of Plant Protection some years ago. Educated at Bablake School, Coventry, and Birmingham University.

Sydney Keers joined ICI (Hyde) in 1944 as a costs clerk in the Accounts Department. While at Hyde he passed the intermediate examination of the Institute of Cost and Works Accountants and has now left the Company.

Kenneth Wadsworth is deputy works manager at Rocksavage Works. Joined the Research Department of General Chemicals Division in 1946 and was seconded to ICI (New York) in 1957. He claims, in the course of business and holidays in the United States, to have set foot in 38 states. Has also visited Canada and Mexico.

The ICI Magazine, price twopence, is published monthly for the interest of all who work in ICI, and its contents are contributed largely by people in ICI. Edited by Sir Richard Keane, Bt., with the assistance of Colin Forbes as art editor and Anne Bilsland as news editor, it is printed at The Kynoch Press, Birmingham, and published by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1 (phone VICtoria 4444). The editor is glad to consider articles and photographs for publication, and payment will be made for those accepted.

Bryan Alderson

Dr. Eusebius Holmes

Kenneth Wadsworth

From my point of view

Image of Britain, *by Mark Abrams*

By now it is sensible to expect that Britain will, in the reasonably near future, become a full-fledged member of the European Common Market. The potential economic advantages of this move are considerable. The six countries who are already members of the association have a combined population of roughly 170 million people, and many of these people have a standard of living very similar to our own. In other words, they *could* buy from British manufacturers much the same commodities as our manufacturers are already producing for the British home market, and they *could* buy them in very considerable quantities. They could, but will they?

Sooner or later they probably will. But how soon? This will depend to an important extent on the general picture that the ordinary consumer in France, Germany, Holland, Italy, Belgium and Luxembourg carries around in his head about Britain and British goods. If, in a general way, he believes that we are exporters of goods which most of the time are first-rate, this will help our exporters to sell their goods to him. But if, on the contrary, his general belief is that our products are pretty poor, it is going to be a tough job to persuade him to buy from us—even when our goods are, in fact, extremely good.

Dutch Viewpoint

What sort of image does the European man in the street in fact currently hold about our manufactures? In an attempt to throw a little light on this, a research organisation in Holland recently carried out a survey and its director, Mr. Adri Bakker, presented his findings to a conference of British businessmen at the beginning of December. In considering the findings it must be remembered that a large proportion of Mr. Bakker's countrymen speak, read and write English, that many of them come to this country for their holidays, and that there have long been close and friendly relations between the two nations. In spite of these circumstances, when a large representative sample of Dutch adults were asked to name any British goods that were sold in Holland, nearly one-third could think of nothing. And those who gave positive answers were sometimes right (when they mentioned motor cars and textiles) but often wrong (when they named bicycles and cigarettes).

Low Rating

One of the more revealing questions in the survey ran as follows: "Compared with goods imported here from other countries, how do British goods seem to you on each of the following points?" The "following points" embraced most of the criteria that consumers are concerned with when they set about buying goods. Only 20% said that in quality of materials they would expect imports from Britain to be better than goods imported from other countries. When they turned to consider other points the replies were even less encouraging. Only 18% felt that in quality of workmanship British goods were better than other imports; 14% said they thought they would be better value for money, and a mere 8% answered that British goods would be better than other foreign goods when it came to up-to-date design and style. On the whole, that adds up to a far from bright image of British goods in the eyes of the Dutch customer—and similar enquiries give similar answers from other Continental countries.

In order to put these answers about British goods into a realistic comparative perspective, people in Holland were asked the same question about imported German goods. On every one of these points they gave German goods an appreciably higher rating; the extra votes for them were particularly heavy when it came to value for money and up-to-date design.

It might be argued that replies such as these merely reflect the ignorance and errors of foreigners, that in fact our goods are much better than those of our competitors when it comes to quality, workmanship, design and price. Maybe; but it is not very likely. In spite of the claims of some of the more exuberant public relations officers and in spite of the fears of some critics of public relations, images cannot be created on the basis of fantasy. If a political party or a company or a nation has an unfavourable image, almost certainly this reflects real facts. And unfavourable images can be altered only by first altering the unfavourable facts. Only when that has been done can the propagandists get to work and do a successful job.

First Step

It would seem that there are two essential first steps in the British drive for increased exports to Europe. As a start we must produce better designed and better made goods at more competitive prices, and secondly we must then educate Continental consumers to an acceptance of these new facts so that their general acceptability of any goods marked "made in Britain" is much higher than it is at the moment.

The opinions expressed in this article are not necessarily those of the Company.

DIQUAT —is it a major break-through?

Diquat has already been sold under the trade name 'Reglone' for potato haulm destruction. But there is more to diquat than this. The action is something entirely novel. Diquat will kill green growth by desiccation without affecting the soil. You can thus plant or sow right after using it. An era of less hand-weeding in the garden is thus in sight.

by Dr. Eusebius Holmes

THERE are two types of discoveries in the crop protection field—those which open up entirely new vistas of agricultural development and those which are improvements or modifications of existing methods. Among the first the discovery by ICI of the hormone weedkillers, MCPA and 2,4-D, has been described by a number of outstanding world agriculturists as the greatest break-through in agriculture—certainly of the 1940s, possibly of all time. These chemicals have revolutionised selective weedkilling, have done jobs previously thought impossible, and made possible new, better and cheaper farming practices.

The more recent discovery, again by ICI at Jealott's Hill, of diquat as a herbicide/desiccant is every bit as outstanding, novel, and potentially important to world agriculture. Diquat is the coined common name accepted by the British Standards Institution for the 1,1′-ethylene-2,2′-dipyridylium ion which, in the form of its dibromide, is the active ingredient in the commercial formulation 'Reglone.' This new Plant Protection Ltd. product has been sold this year for potato haulm killing and for pre-emergence weedkilling, not only in Britain but in many other parts of the world, and many other valuable outlets have already been indicated.

What is the background to the discovery of these agricultural chemicals in ICI? Ever since the Company was formed certain sections of some Divisions have been interested in these problems. Following very early work by Cassel Cyanide with HCN and 'Cymag,' by the Alkali Division with fungicides and by Dyestuffs with 'Agrosan,' 'Shirlan' and wetters and spreaders, the search for new products began to be systematised at Jealott's Hill late in 1935. This was intensified with the formation of Plant Protection Ltd. in 1937 and has steadily increased since. In the early days the chemicals tested were mainly sent from the research laboratories of the various ICI Divisions —a chance method of selection which occasionally disclosed something very useful. An example is benzene hexachloride (BHC) in 1942. Today the approach has radically changed, by far the larger proportion of chemicals tested having been deliberately selected or synthesised as a result of deductions from earlier work, of theories regarding the activities of different atomic groupings or just plain hunches. All these chemicals are put through what are known as screening tests at Jealott's Hill—in test tubes and Petri dishes, on plants in boxes or on small plots in the field—to see whether they have any useful effects in killing insects, fungi, weeds and so on. There must always be a large element of luck in any discovery, since one cannot clearly foresee a pattern of activity which has never previously occurred, but the method by which we seek new crop protection chemicals is now much more purposeful.

Story of Discovery

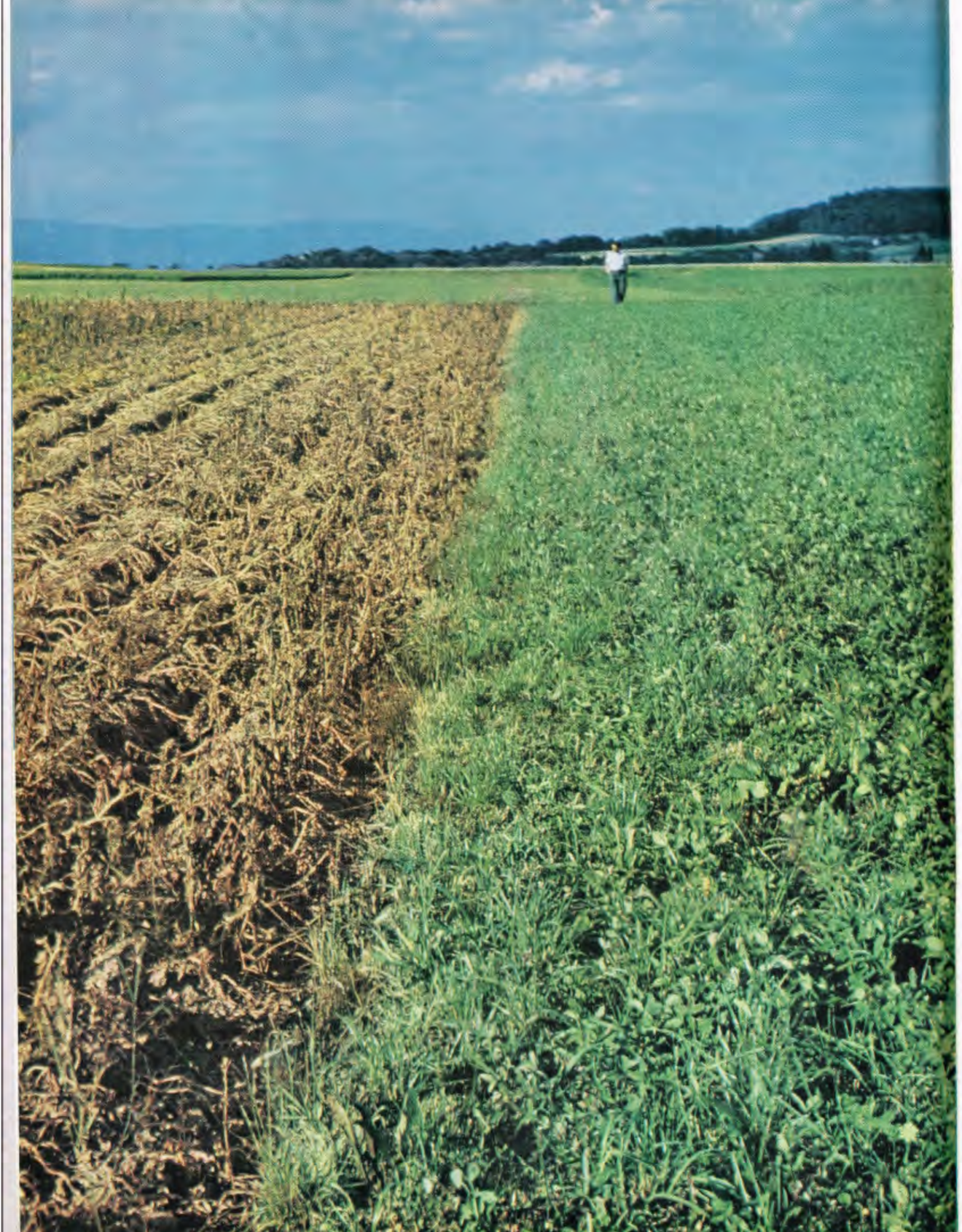
The discovery of the hormone weedkillers was based on fundamental work on plant hormones and probably comes closest to a specific attack which reached its target. Diquat was discovered during a systematic examination of the herbicidal properties of a group of chemicals which was known to have some activity against green plants, but the activity of this chemical was so entirely unexpected that it cannot really be claimed as the logical outcome of the original research. The important fact is that when a chemical with novel biological properties turned up in the screening tests ICI had the skilled staff to recognise the unusual and look for useful agricultural outlets for such effects. It was the break-through that rewards the pains-taking work of a whole team of scientists.

Diquat is not just another weedkiller with rather better or rather worse properties than those already well known; it is radically different, making possible entirely novel uses. This can be emphasised by the fact that when diquat was first announced one of ICI's American competitors made a small sample, tried it out against existing weedkillers and decided it had no merit!

Much of the early field work with diquat was done despite the fact that the essential manufacturing raw material, dipyridyl, was then little more than a research curiosity only used in minute quantities for analytical work. At that time it cost upwards of £80 per pound weight and only provided twice this weight of the final product. At this stage it took much faith and foresight to predict that an economic process could be developed.

Still more faith was required when an intensive programme in Heavy Organic Chemicals Division led to the conclusion that the process under examination was impracticable. At this stage, when the prospects for diquat looked poor indeed, ICIANZ reported that a simple modification to a process earlier discarded promised to turn a very low

Research work *in the laboratories of Plant Protection Ltd. at Jealott's Hill, where diquat was discovered during a systematic examination of the herbicidal properties of a group of chemicals known to have some activity against green plants*



yield into a satisfactory one. A further programme in Dyestuffs Division turned this from a laboratory process to a producing plant in less than twelve months.

It will be asked: How does diquat work? On casual examination the action of diquat does not appear very original. It penetrates the green parts of plants very rapidly and kills them. The effect is rather similar to heat, and it would be difficult to distinguish a brown circle on the lawn produced with a hot kettle from a similar circle produced with diquat. As the result of work at Jealott's Hill, we probably know more about the way in which diquat kills plants than is known for any other weedkiller. The activity depends on the reversible production of what is known chemically as a free radical within the plant. This free radical results from the reduction of diquat at redox potentials which occur during normal metabolic processes. The free radical is very reactive and diverts part of the normal metabolism of the plant, possibly to the production of a highly toxic chemical such as a peroxide. Diquat kills plants very rapidly in sunlight and much more slowly in the dark, which suggests that it is in the photosynthetic processes that its reduction takes place most readily.

Four Bull Points

Some of the more outstanding properties of this novel chemical may be listed:

(*a*) Diquat is very quickly absorbed into the aerial parts of plants, and the death of leaves is extremely rapid. Effects may be seen on some plants within an hour or two, and the leaves of treated potato crops are completely desiccated in a day or two at rates of application of the order of $\frac{3}{4}$–1 lb. of diquat per acre. Rain following within an hour or two of application does not affect its action, and indeed in this particular aspect it scores over all other desiccants in use today. The rainfastness of diquat was strikingly demonstrated in the UK and many European countries in the wet potato harvesting season of 1960.

(*b*) In contact with the soil diquat is rapidly absorbed and completely inactivated. This fact is of great importance, since the absence of residual activity in the soil indicates that it can be used for pre-emergence weed control. Pre-emergence in this connection means pre-emergence of the crop seedlings; in other words, the seedbed is prepared, weeds are allowed to grow and treated, and then the crop seed is sown. This concept has been developed this year on a wide range of agricultural and horticultural crops; of these sugar beet is one of the more important. It is important to emphasise that under certain soil and weather conditions residues from some of the chemicals at present used for these jobs persist in the soil after application, causing damage to the following crop.

The first practical use *of diquat was for killing potato haulms just before harvesting. This assisted mechanical harvesting, reduced weed growth, and prevented the spread of potato blight and virus diseases. The brown area on the picture shows where a potato field has been treated with diquat. The remainder of the crop is unaffected*

(*c*) Diquat is highly soluble in water, which makes its formulations suitable for ultra-low-volume application, i.e. by aircraft at rates as low as 2–4 gallons of spray per acre, in addition to the normal ground application rates in agriculture of 10–100 gallons per acre.

(*d*) Diquat is of very low toxicity to animals, shows little corrosive effect when an inhibitor is included in the formulation, and is free from fire hazard. In these respects diquat compares more than favourably with other products used for the purpose—the extremely poisonous sodium arsenite (now banned in Britain) and dinitro-orthocresol; sulphuric acid, which is extremely damaging to spraying machines; and sodium chlorate, which carries a dangerous fire hazard. In this general connection it may usefully be added that a few chemicals still very useful in agriculture are hazardous. ICI's policy is, in the short term, to find safer ways of using such chemicals; in the longer term, to discover and substitute non-hazardous products.

Returning to the uses of diquat, mention has already been made of its first practical outlet in Britain, the killing of potato haulms just before harvesting. The primary object of this is to assist mechanical harvesting, to reduce weed growth, and to prevent the spread of potato blight and virus diseases.

Extensive Trials

In the last three years a whole series of small-scale critical trials and large farm trials has been carried out, not only comparing diquat with existing materials but looking for novel outlets. In 1960 and 1961 extensive large-scale field trials were also carried out in Europe; so far as possible, farmer-owned equipment was used to match as nearly as possible the conditions found on farms. Not only this, but diquat was applied for potato haulm destruction by helicopter and fixed-wing aircraft to observe the effect of these means of application. In Europe the object was mainly to evaluate the chemical for the destruction of *seed* potato haulm early in the season to prevent, or at least restrict, the spread of virus disease by greenfly. Trials conducted in Germany, Switzerland, Holland, Denmark, Sweden and France have shown that there is an immediate outlet for diquat in these countries, and indeed local agents are calling for more than we have been able to let them have hitherto.

In all this work it is most important to determine whether any residues of chemical remain in treated food crops, and extensive tests have been carried out to check this for potato tubers. Techniques developed at Jealott's Hill are able to determine residues as small as one part in 10 million parts of ware potato and even with some measure of success at one part in 100 million. The results of this work enabled the Ministry of Agriculture, Fisheries and Food to give clearance for the use of diquat for potato haulm destruction in this country. Not only are sprayed crops safe for human consumption but, the flavour is unaffected.

Apart from potato haulm destruction and pre-emergence

weedkilling, diquat has a great future as a crop desiccant. The technique of desiccation is designed, among other things, to improve conditions for the harvesting of seed crops by removing unwanted leaf tissue and late weed growth. So far the product has been used experimentally on a great number of crops such as clover, lucerne, grasses, rice, castor beans and sugar beet.

It is also showing great promise for desiccating cotton plants to aid mechanical harvesting and reduce the amount of trash to be removed in the cotton ginnery, the factory where cotton fibre is separated from leaves, twigs and other trash. In the High Plains and Blacklands areas of Texas diquat has shown itself to be an effective desiccant on stripper types of cotton. These are cottons which are "picked" by a machine which removes everything except the main stems of the plants. It has obvious advantages over the current most popular product, arsenic acid. It has also been shown that aerial application is quite practicable.

Removal of Trash

Another interesting outlet arises from the fact that it is a practice in some of the sugar cane areas to remove leaf trash from sugar cane by burning in order to facilitate harvesting and subsequent crushing of the cane. In areas such as Louisiana and British Guiana chemical desiccants are being tested as an aid to this burning and diquat has proved the most satisfactory chemical so far.

Where crop seeds germinate slowly (as for instance with onion and beet) a seedbed is often a mass of weeds before the crop comes through. Diquat, having no residual effect in the soil, should be an excellent weedkiller to clean up the seedbed and give the crop a good start. This use would be valuable in many crops and has been the subject of many field trials this year. Work on similar lines is also being carried out in many overseas countries, and by the end of 1961 it is hoped that many more label recommendations will be possible.

Diquat also looks promising for control of water weeds and is probably safe to fish at levels which are effective.

In the Garden

Even in the ordinary garden a whole number of uses for diquat have already been uncovered. It is possible by reasonably careful application to kill many weeds at the base of hedges, round the boles of fruit trees, between bush fruits, and even between the rows of vegetables without doing damage to the crops and, of course, without leaving dangerous residues in the soil.

From what has been said in this brief article it must be evident that ICI has once again achieved a break-through in agricultural chemicals which will have far reaching beneficial effects on world agriculture. And diquat is only the first of the dipyridyls; a second and perhaps complementary product is now being developed.

Some Likely Uses for Diquat

Pond weeds. *A promising new use for diquat appears to be the control of water weeds, as it does no harm to fish living below the surface provided it is applied at the recommended rates to do the job*

Firebreaks. *In forest and rangeland, where the maintenance of firebreaks is extremely important, diquat is sprayed in the firebreak strips in the wet season. It desiccates the area so that there is nothing there to burn when the dry weather comes*

Sugar cane. *For easier harvesting it is the practice in some sugar cane areas to remove leaf trash from the cane by burning. In places such as Louisiana and British Guiana chemical desiccants are being tested as an aid to such burning, and diquat has proved the most satisfactory chemical so far used for this purpose*

Sugar beet. *In the cultivation of sugar beet diquat can be used as a double-purpose weedkiller. It will kill off weeds in a prepared seedbed before the crop is sown or, because it has no residual effect in the soil, can clean up the weeds while the beet seeds are germinating in the ground*

Cotton. *By desiccating cotton plants at harvest time, diquat reduces the amount of trash to be removed in the cotton ginnery, the factory where cotton fibre is separated from leaves and twigs. Aerial application has been shown to be quite practicable*

Fruit bushes. *By reasonably careful application diquat can be used to kill many weeds at the base of hedges, round the boles of fruit trees, between bush fruits such as these blackcurrants, or between rows of vegetables*

Finland – Poised between East and West

A little country of four million people lives cheek by jowl with mighty Soviet Russia. But they still maintain a precarious independence. How do they do it – these hard-working, undaunted people?

By Bryan Alderson

The traveller who leaves the well-worn tourist trail to Scandinavia and who crosses the Baltic to Finland is well rewarded. Here is a nation unique on this planet. A nation which today, as so often in its stormy history, has escaped the cruel logic of the mid-twentieth century.

After two bloody wars with the Soviet Union, Finland remains the only Western democracy to border Russia with her liberty unimpaired. Finland is not a member of NATO, she is completely without allies, and by the peace treaty she is forbidden an army of more than 35,000 men. She has kept her liberty; and she remains to teach the world a great deal in the realms of music, sport, architecture, sculpture, literature, good sense, and the true meaning of democracy.

It is not only in the cold war that Finland is unusual. This is the youngest country in Europe. After 700 years of bloodstained history, first under the Swedes and then under Czarist Russia, revolutionary White Finland, under the national hero Marshal Mannerheim, threw out the Russian garrison in 1918 and was declared a republic the following year. The atmosphere, then, is not the leisurely one of age-old experienced, sophisticated Europe. This is a dynamic new nation fighting to tame a wild land of lake and forest as raw as the north of Canada. Everything seems new, everywhere roads are being built, buildings are going up with a restless energy.

Only 4,000,000 Finns live in a land area half as big again as Britain. Huge forests of pine, spruce and birch account for over 71% and myriads of lakes account for another 10%. Only 13% of the land is cleared for cultivation, and the forest is continuously trying to win back this meagre part that man counts as his own. The soil is for the most part thin and of poor quality, since the bedrock is largely primeval granite. In fact, most of the subsoil consists of moraine material left by the great glaciers which dominated the country in the Ice Age. There are very few mineral deposits—no oil or coal, only a small output of iron, copper, and zinc.

This, then, is not an easy land to live in. Indeed, until about a hundred years ago a famine was almost inevitable if the harvest was a bad one. Really the only wealth that Finland possesses is the "green gold" of her forests and the *sisu* of her people. This word *sisu* is one which you meet continuously in Finland. It means a type of no-surrender, Dunkirk spirit which permeates the Finnish people in hard times. They seem to be able to call on hidden reserves of moral strength in the face of seemingly impossible odds and miraculously overcome their difficulties.

Pagan Spell

Living as they do in so large and wild a country, the Finns regard the vast forests in the same way as the sensible Englishman looks on the sea—a wild, unpredictable and often cruel force that man must treat with respect if he is to gain a living from it. A Finn never treats his forests lightly, and deep in his heart he is not completely certain if the ghosts of the old pagan spirits are dead in the darkest groups of spruce and pine.

The mighty forests cast a spell even in the heart of the most phlegmatic Anglo-Saxon. Eternity seems to lie in the repetition of forest lake and moorland stretching endlessly out of sight. Human efforts at penetration seem insignificant in the wilder parts. Roads and railways can make little progress in regions like the Finnish Lake District, where myriads of lakes large and small are half the surface area.

Snow blankets field, forest, roads and frozen lakes alike for the largest slice of the year, so the Finn takes to his skis. Everybody seems able to ski, old and young. They can ski almost before they can walk. Many Finns think nothing of covering forty miles or so a day.

Attractive though the lakes and forests look in their winter guise, farming in these conditions is none too glamorous. Experts consider that Finland is just about as far north as farming can be successfully undertaken, and many a weary Finnish farmer at the end of the day might well consider that it is too far north. The fact is that the 30% of Finland's labour force who toil on her farms manage to produce only about 12% of the gross national product, in spite of very long hours of work by the farmer's family.

Tough Farming

The tragedy of Finnish farming is that it would be hard to find a country where the love of the land is greater or where rewards are so small for the effort expended. Most of the farms are very small by our standards, and more than two-thirds have less than 10 hectares of cultivated land. Many of the farms are too small for tractors, and many more tend to be swampy and have to be drained by channels which render the use of tractors impossible. There are still about a quarter of a million horses on Finnish farms, which works out at about one horse per farm. There are only about a hundred thousand tractors. Farming is a very hard life in Finland, and things are not helped by the fact that cattle have to spend seven or eight months indoors because of the climate.

Although the Finns are still basically tough countrymen, they seem to take very well to city life. The three "big cities"—Helsinki, Turku and Tampere—are very interesting, since the Finns have a rather different concept of city life than we have. Finnish towns are intended very much for the living present. The past has far less impact on the inhabitants than it has in the great cities of the West. There is no pomp and little splendour. In Helsinki, the capital, small boys ride their bikes happily on the steps of Parliament itself, and a stone's throw away, equally noisy youths play a muddy and boisterous game of football on a thoughtfully provided pitch. Shades of Westminster! Government is of the people, for the people, and by the people; and the Finns have a very sensible view of Western institutions which suffer from excessive reverence.

Town planning means far more in Finland (as it does in all Scandinavia) than in Britain. The Finns see it not just as a problem of how to contain a city tidily within a green belt; they approach the problem far more basically—how to build a city which reflects, and is suitable to, the national character. Each new building must contribute something to the Finns' image of themselves.

Of course, conditions are different from those in Britain; in a country where nearly all women go out to work if they can, where there is a heavy snowfall which must be cleared immediately, and where the temperature is often such that coming home to a cold house is more than unpleasant, then the preferred home is a centrally heated block of flats. In these blocks often magnificently designed there is a caretaker who clears the snow, stokes the boiler, and generally attends to the many jobs which the climate creates. Around the flats are always open spaces, which are usually chunks of the original countryside complete with birch spinneys and granite outcrops. Here children can play happily and safely, remote from the traffic perils which face similar children in Bermondsey or Birmingham.

Heavy Price

Finland is not a rich country, and she paid a heavy price in war reparations to Russia. She is applying skill, courage, and the full force of modern science towards solving her economic problems. Until 1945 the great forests and their many by-products were virtually the country's only source of income. Logs were cut and floated down the rivers in spring to large riverside factories, and from there found their way to many parts of the world in the form of sawn timber, pulp, paper, newsprint, pitprops, fibre, plywood, board, matches, cellulose and many more. Although the woodworking industry still produced a dangerously high 75% of Finnish exports in 1961, the other 25% consists mainly of the products of the brand new Finnish manufacturing industry.

This rather artificially based industry came into existence largely as a result of the peace treaty. Under this severe treaty the USSR demanded that a large part of the reparations should be in the form of many goods that the Finns had never made or had only produced in small quantities—ships, cranes, trucks, road-making and earth-moving equipment, large cables, rock drills, tractors, buses, power and propulsion machinery, etc. This was a staggering blow for a small nation with little manufacturing industry, but in those hard early post-war years the Finns worked all hours of the clock and by intelligence and skill built up a large industry to cope with these demands. The reparations were all paid on time, Stalin had no excuse to seize the country, and Finland now remains with a modern manufacturing industry which contributes about a quarter of her exports.

Common Market

It is perhaps not generally known in the West that the possibility of Britain joining the Common Market is of vital concern to Finland. About 34% of Finnish exports go to the UK and our EFTA partners, and about 28% to the present Common Market. The other wood-producing countries, Sweden, Austria and Norway, are at present outside the Common Market and compete on equal terms with Finland in this field. If Britain joins, however, there is a strong chance of Finland's competitors also joining. If this happens, Finland's economic position could be pretty grim. Up to 58% of her exports would face tariff walls while her competitors would be safe behind them.

There is no question of Finland being able to join the Common Market herself. Russia would never allow Finland to join an organisation which they consider to be a political extension of NATO. Somehow, and very quickly, the Finns must find an answer to the grave economic problem rearing up ahead.

What of ourselves? ICI is exporting to Finland annually at the rate of £1¾ million a year, with 'Terylene,' plastics (including 'Alkathene') and dyestuffs dominating. As long ago as 1937 ICI formed jointly with others a company called Finnish Chemicals O.Y. to produce electrolytic caustic soda and chlorine, principally for the important paper and pulp industry. This company, in which ICI still has a major interest, continues to flourish and in fact is expanding.

The Hidden Warmth of Buried Heat

This technical development was accelerated by the war and pioneered by ICI Metals Division. Through it you get floor heating at the cheaper off-peak tariff and travel is made safer by roads and aircraft wings being kept clear of ice.

Contributed by Metals Division

When icicles hang by the wall . . . that is the season when 'Kumanal 40' comes into its own. 'Kumanal 40' is a copper alloy resistance wire made at the Elliott Works of Metals Division in Birmingham. It is proving increasingly popular for underfloor heating—not only in the home, but also for reducing the danger of "black spots" on our new motorways in the winter. Other important outlets are in greenhouses (for soil warming) and to prevent ice formation on aircraft wings.

'Kumanal 40' is particularly suitable for heating because it has a long life without significant deterioration. It was first developed as an alternative for alloys containing nickel, an essential wartime strategic material. In 1942 supplies of nickel were desperately short, and the Ministry of Supply approached the Research Department at Witton for help on this urgent problem. Essential requirements of the substitute alloy were that it should be nickel-free, have good resistance to oxidation at temperatures around 350°C, and an electrical resistance which remained virtually constant, irrespective of rise or fall of temperature.

Experimental work was begun, and within six months the department had made, cast, drawn to wire and tested 60 different alloys and selected the most promising. It was approved by the Admiralty. Within three months it was in production and was used on a significant scale for the remainder of the war.

After the war, the ready availability of traditional nickel-bearing alloys led to a decline in the use of 'Kumanal.' The middle 1950s, however, saw a considerable revival of interest when the underfloor heating of houses, blocks of flats and offices was developed and encouraged by the electricity authorities to provide an outlet for cheaper "off-peak" electric power. Electrical resistance heating cables are embedded in the concrete flooring or in walls or ceilings, so that each surface becomes an efficient low-temperature radiator. Underfloor installations (which make use of the off-peak tariff) are designed to exploit the heat capacity of the concrete base, and the heat response is slow. On the other hand, ceiling and wall cables are covered by a relatively thin layer of plaster, so that a much faster heat response is obtained; this is particularly suitable for day-tariff operation.

Laying 'Kumanal' cables under the floor. *The cables are shown being embedded in concrete, which discharges its heat slowly after receiving it during the night at the cheaper off-peak tariff of the electricity authority*

Fault-finding

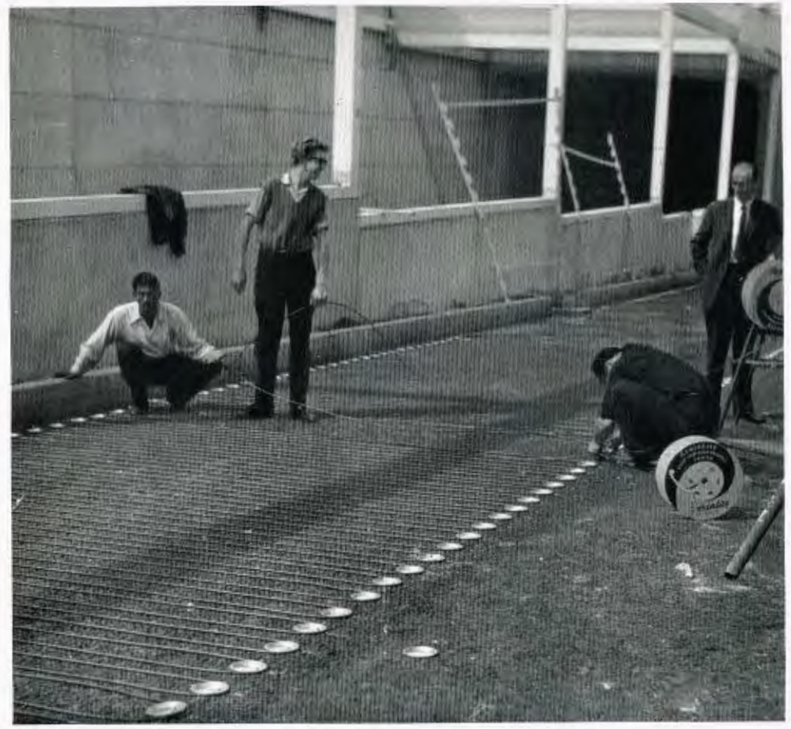
Should failure occur, faults can be located quickly by electronic equipment based on mine detection techniques. This enables cables to be repaired with disturbance confined to about one square foot.

A number of electric heating cable manufacturers were quick to appreciate the technical and economic advantages of 'Kumanal 40,' and its use for electric resistance heating cables has now been firmly established. New outlets for 'Kumanal 40' are being developed. For example, the chemical industry uses it in the form of insulated wire or tape to keep liquids from solidifying while they are being pumped through pipelines. And its use for electric blanket heating elements is under development.

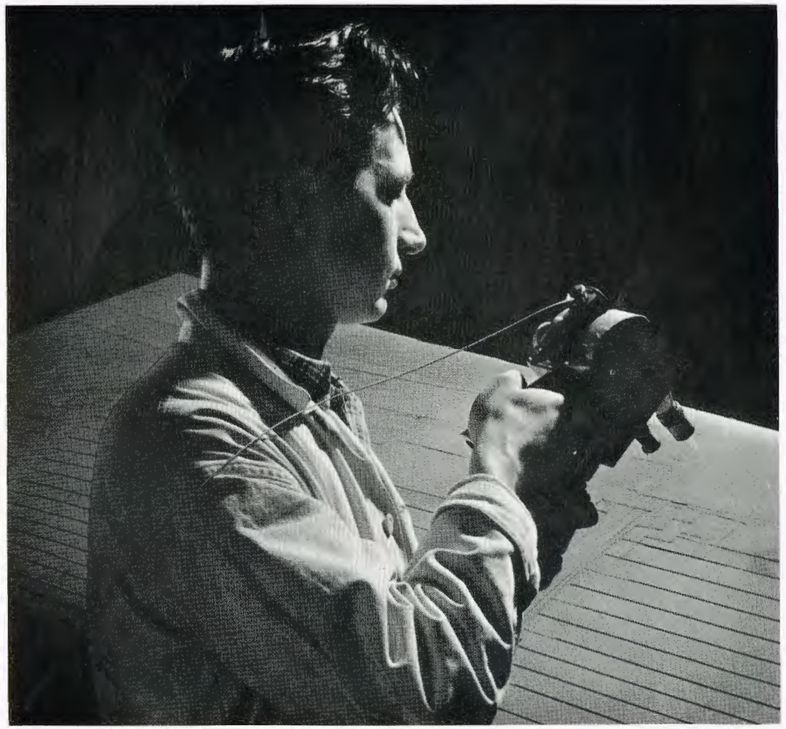
45 Miles of Wire

'Kumanal 40' starts life as a 5 in. billet which is extended many miles in length by a combination of hot rolling, cold rolling and wire drawing until it finally emerges in long-length coils. Some of the spools weigh 300 lb. and carry 45 miles of wire in one unbroken length. Rigorous tests are carried out at every stage of manufacture, each coil coming under meticulous examination. It says much for Elliotts' skill and production methods that 'Kumanal 40' can be offered at a price which makes it an attractive commercial proposition.

Sales of 'Kumanal 40' have been most encouraging during the past few years and further advances are forecast as off-peak heating in the home makes headway.



The danger of skidding *on new motorways in winter months is considerably reduced by laying 'Kumanal' under the surface of the road at "black spots," which are thus kept free from ice*



Ice formation can be prevented *on the wings of an aeroplane by heating. To do this, 'Kumanal' wiring is fed through flame spray guns to form a sprayed-on heater element in the wings, which is then connected to the plane's electrical circuit*

People and events . . .

New ICI Laboratory

THE Board has agreed in principle to the setting up of a new central laboratory, responsible to the research and development director, in order to increase the Company's exploratory effort in the high-polymer and petrochemicals field. **Dr. Duncan Davies,** research director of General Chemicals Division, has been appointed head of the laboratory. As we go to press no announcement has been made of the site of the new laboratory, which is expected when in full operation to have a staff of about one hundred technical officers.

With the news of the new laboratory came the announcement of changes in the organisation and activities of certain Head Office departments. The Research and Development Departments have been amalgamated, and Dr. Davies is for the present head of the new department in addition to his duties as head of the laboratory. Technical Department is being reorganised and strengthened to give increased attention to the Company's expansion and long-term development. **Mr. W. A. M. Edwards,** purchases controller, takes over as head of this department and will be succeeded by **Dr. H. G. Reid,** president and chairman of ICI (New York).

To Head the Laboratory

DR. Duncan Davies, who is 40, is a native of Liverpool and was educated at Liverpool College and Trinity College,

Dr. Davies

* * *

Oxford where he did research under Sir Cyril Hinshelwood. He joined ICI in 1945, and has spent most of his career in Dyestuffs Division, first doing research in the application of physical organic chemistry to process problems, becoming a section leader in 1951. From 1955 to 1959 he worked in the Grangemouth Factory in Scotland as head of the Colours Experimental Department. For the last two years he has been with General Chemicals Division, first as deputy research manager and then as research director, where he has been helping to build up a much stronger organic chemical research force and to plan laboratories (construction just started) as part of the Division's new North Cheshire headquarters.

Dr. Davies is married and has four children. When he has any spare time, he says he dabbles incompetently in music, sailing, or anything else that looks interesting.

No More Registration Fees

FROM 1st December fees have no longer been payable to the Company on the registration of any transfer or other document of title or on the renewal of any stock certificate in respect of ICI's Ordinary, Preference and Loan Stocks.

What are the reasons for this step? **Mr. W. N. Lacon,** ICI registrar, explains that the Stock Exchange is trying to streamline its registration procedure. One recommendation they are urging on all companies whose shares are quoted on the Stock Exchange is that they should abolish registration fees. Certainly such fees are very unrealistic, since they have remained unchanged over many years, and a nuisance since they slow up registration procedure. A number of companies, including ICI, have now taken this step.

ICI's decision was quoted in a number of national newspapers, among them the *Daily Mail*, which commented that "what the company would lose in income each year from this fee should more than be made up by the increased goodwill of shareholders."

Prospective Candidate

MR. **C. F. Thring,** Billingham Division secretary, was recently adopted by the Sedgefield Conservative Association as prospective Conservative candidate for Sedgefield. Mr. Thring, who is 47, joined the Company from the Civil Service in 1948. He served for a short time in the ICI Secretary's Department at

Mr. Thring

Millbank, and then went for a period of training to the Secretary's Department of the Dyestuffs Division and finally joined the Billingham Division at the end of 1948. He became assistant secretary and then Division secretary in 1956.

He has many interests outside the Company. He served on the Durham

Wilton's new recreation club premises (right) and (left) Mr. Wright, who performed the opening ceremony

County Council for eight years, and in the three elections which he fought he increased his majority each time; he retired in May 1961 from the County Council. He is a local magistrate and has served on the council of the local chamber of commerce, and is chairman of the Lord Chancellor's SE Durham Advisory Committee on General Commissioners of Income Tax.

The Billingham Synthonia Boxing Club has claimed his interest, and for several years he has been chairman of the Boxing Club. Mr. Thring is married and has two children.

Wilton's Clubhouse

"IT gives me the greatest pleasure to open this clubhouse: may it bring much happiness to all the members today and to the many thousands of members who will use it in the years to come." With these words **Mr. C. M. Wright,** ICI personnel director and former chairman of Wilton Council, declared open the new clubhouse of Wilton Works Recreation Club on 25th November.

The ceremony was aptly described as a family party by **Mr. J. C. H. McEntee,** chairman of Wilton Council. About 200 guests, representing all sections of the Wilton community, including some pensioners, assembled in bright, crisp weather for the opening ceremony. Afterwards they toured the new premises, admiring the design and the attractive décor which represent the culmination of years of detailed study to meet the present and future recreational needs of Wilton.

Soon after the last of the opening ceremony guests had departed, the premises were again open in the afternoon for viewing by club members, and in the evening it had its baptism with the main hall crowded for the first-night concert.

With the completion of the clubhouse, the Company has now put something like a quarter of a million pounds into recreational facilities at Wilton. There are about 8000 members, and the subscription today remains the same as when the club was first formed—threepence a week.

Family Tradition

FIFTY years' service in ICI is no longer a rarity, but it is seldom that a woman stays the course for this long period. The record of the Spiers family of Nobel Division's Westquarter Factory is therefore all the more remarkable. **Miss Elizabeth Spiers,** who will have a spring holiday at the Company's expense to celebrate her completion of a half-century's service with Nobel Division, is in fact the third woman in her family to achieve this milestone. She shares the distinction with her elder sister, **Miss A. M. Spiers,** and her cousin **Miss M. C. Spiers,** who retired respectively in 1955 and 1957.

This "hat trick" is by no means the whole of the family's story of service. Another cousin, **Miss K. Spiers,** had 45 years' service when she retired in 1948, and yet a third cousin, **Miss M. Miles,** whose retirement was caused by ill health in 1957, completed over 49 years.

A prominent member of Westquarter Factory today is **Miss Jean Macfarlane,** a works councillor and a member of the ICI long service awards committee. Miss Macfarlane is a niece of Miss Spiers and has 28 years' service to her credit.

Boom in Bottles

THE Wallerscote Works of Alkali Division is almost certainly the biggest works in the Commonwealth given over to the manufacture of a single chemical, and it is not far short of being the biggest in the world. Of every ton of soda ash it makes, some 5 cwt. goes overseas for glass manufacture and other uses, and of the remaining 15 cwt. sold in the home market some 12 cwt. goes to the glass trade. Of this 12 cwt. two-thirds goes into the manufacture of holloware—bottles, jars, phials and what you will.

The holloware production figures are quite astronomical. There was a big jump from the 1959 levels to those of 1960, and trade last year kept up the good work. The most spectacular increase was in bottles for beer, wines, spirits and soft drinks. In 1960 1421 million new bottles were sold—well over double the 1959

ICI/Courtaulds Merger Discussions

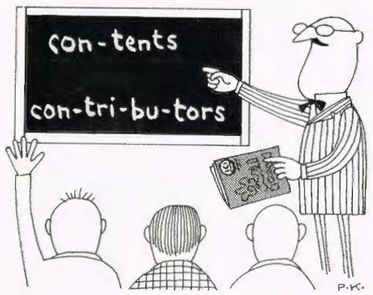
The Chairman, Mr. S. P. Chambers, announced at a special press conference held at Imperial Chemical House on 18th December that friendly discussions had been proceeding with the directors of Courtaulds on a merger of the businesses of the two companies, and that the ICI Board had informed the board of Courtaulds of their intention to offer to the stockholders of Courtaulds to acquire the whole of the ordinary and preference stock of that company in exchange for ordinary and preference stock respectively of ICI.

figure. And this does not include the thousands of millions of returnable bottles in the trade. This means that every man, woman and child of us drinks, breaks, otherwise disposes of, or fails to return 28 bottles a year.

This enormous figure does not include 325 million bottles for household detergents and lubricating oil, 798 million bottles for medicine, and 359 million for toilet products and perfumes. Then there is the food industry with 1565 million jam jars, pickle bottles, mustard pots and such like. This amounts to another sixty glass containers a head a year. So an average family of say three or four children is relying on and disposing of a total of one and a half glass containers a day, not counting containers that go back for more milk or for 2d. on the bottle.

Our English Primer

EACH month the Editor receives many requests from people outside the Company for copies of the *Magazine*. It is not possible to meet all the requests, but certain categories generally get a favourable answer, among them science



masters and technical college lecturers. We have even had one or two requests of this sort from abroad. A rather special one arrived in the *Magazine* office recently. It was from the English master at a technical high school at Boràs, Sweden. He asked if ICI could let him have 13 copies of an issue of the *Magazine* containing an article on laboratories. He felt this would be a very appropriate text for their English studies for a group of his students training to be chemical laboratory assistants. By now Mr. Enarson's students should have their copies of the *Magazine*, and we hope they are duly making rapid strides with their English.

Mr. Bagnall

Mr. Penney

Fleck Awards

TWO of this year's Fleck Award winners have been announced. They are **Mr. Gordon Bagnall,** a lab assistant at General Chemicals Division's Pilkington-Sullivan Works, and **Mr. Terence Penney,** a junior clerk in the Treasurer's Department at Head Office. The awards —four are made each year on a rota basis through the Company—were instituted by Lord Fleck when he retired as Chairman.

Gordon Bagnall, who is 18, joined the Company from Bootle Grammar School in September 1960. Since joining the Company he has passed the second year Ordinary National Certificate in chemistry and has added English to the four other GCE passes he obtained at school. A keen Scout, he soon expects to become a warranted assistant scoutmaster and holds the Queen's Scout badge and the Duke of Edinburgh's bronze, silver and gold awards. He is a regular churchgoer and an enthusiastic member of his church's youth club. He also acts as stage manager for a local amateur dramatic society and is a keen philatelist.

Terry Penney is 19 and has been at Head Office since September 1959. Previously he worked for a year for Esso after leaving Winchmore Secondary Modern School, where he distinguished himself by passing his GCE in four subjects. At Head Office he plays in the interdepartmental basketball league and is a keen member of the photographic section. He is, incidentally, choosing a projector as his award. Outside the office he is assistant scoutmaster of the 163B North London Scout Troop—he took twenty-two of his Scouts camping in the Wye Valley last summer—and through his Scouting activities helps with local charity work. In fact he was one of a bunch of volunteers from the group who gave up Christmas morning to cook a traditional turkey dinner for some old people in the district.

As we go to press the Alkali Division and Wilton Works awards winners have still to be announced. Wilton have a total of 58 candidates to consider, the highest number of nominations for a Fleck Award from any Division so far.

It's an Ill Wind

WHILE they don't exactly pray for rain, employees at Nobel Division's Maryhill Factory are not quite as depressed as the rest of the world when it comes. For bad weather means brisker business for this little factory where they make chemicals to keep the rain at bay.

The products for which Maryhill has earned its reputation are aluminium acetate, aluminium formate and aluminium stearate, copper stearate and copper formate. All are used for heavy waterproofing, notably of large tents, tarpaulins for heavy road transport, and protective sheeting for exposed farm machines. It has been calculated that if a year's output from the factory were used to proof a fabric, it would provide an awning thirty miles wide between Glasgow and London.

Among Maryhill's chief customers are well-known Scottish makers of tenting. Audiences watching the Bertram Mills circus remain dry regardless of the weather outside because the Big Top has been proofed with Maryhill products. And the world's largest Big Top, made for South America, is also proofed with Maryhill materials.

Tough Trip

A BLOWN tyre which damaged three studs on the rim of the rear nearside wheel put **Mr. George Bainbridge** (Wilton Works) and his fellow driver out of the running for a possible award in the Royal Automobile Club's tenth International Rally of Great Britain. But it did not prevent them finishing the gruelling 2000-mile rally which ended at Brighton on 18th November.

The Tees-side pair qualified for finishers' plaques—an achievement in itself when one considers that only 81 of the 160 competitors completed the event. The trouble which cost them a higher placing in the results occurred when they

were on their way to Peebles. At this point they had already completed a third of the rally and were only a minute down on schedule. Unfortunately the damage to the wheel resulted in them dropping 1½ hours behind schedule. They realised they could not make up this time and so had to cut out three controls.

By the time this appears in print Mr. Bainbridge will be in the thick of preparations for his next rally. He is one of the British competitors accepted for the Monte Carlo Rally which begins on 20th January, as is **Mr. Brian Field,** Dyestuffs Department sales manager, South Wales Area.

Celebrity

A GANNET recently made an appearance on Scottish television in the programme "Here and Now." It was a temporary inmate of the RSPCA's Mitton animal welfare home in Dunbartonshire. The bird was very tame, which was not surprising, since it was the self-same bird which a month earlier had been cared for by employees of the Irvine Harbour, which is owned by Nobel Division.

The gannet, called Jock, was in the first place found exhausted, its plumage fouled with oil, on the shores of the River Garnock after a severe storm by **Mr. Tom Houston,** pilot house attendant. He took it into protective custody and with the help of Mrs. R. A. C. Henderson, wife of the harbourmaster, nursed it back to health. It proved a difficult patient, with definite preferences where diet was concerned—it scorned sardines but was fond of saith and codling—and it was nearly a month before it was strong enough to begin making trial flights again.

Mr. Houston and "Jock"

Gannets spot their prey from high above the water, then dive to depths of up to 50 feet to make their capture. It was therefore with some misgiving that its kindly captors found one morning that Jock had prematurely taken off before his strength was fully recovered. That their foreboding was justified became apparent when Jock was again picked up exhausted at Ardrossan.

In Brief

Board changes. Mr. P. C. Allen, president of CIL, is returning to this country to re-assume his duties as an executive director of ICI and will take over from **Dr. Caress** as the overseas director responsible for Western Europe. He is succeeded in Canada by **Mr. L. Hynes.**

Trustees. Mr. John Auld (Nobel Division) has been appointed and **Mr. Henry Rawlinson** (Billingham Division) reappointed trustees of the IC (Workers) Friendly Society.

Nearly a record. The very long accident-free run of Derby Works, Dyestuffs Division, of nearly 7½ years ended recently. Only two other Works have made longer runs than this, and in this period Derby Works achieved 1,450,585 hours free from lost time accidents.

Elected to council. Dr. Robert Westwater, manager of Nobel Division's Technical Service Department, has been elected one of the Scottish representatives on the Council of the Institution of Mining Engineers.

Help for spastics. During the past two or three years Ardeer Recreation Club has sent over £350 to the Scottish Council for the Care of Spastics. Most of the money has come from collections taken during the Saturday evening singsongs held by the club.

£1½ million plant. Plans to build a new carbon tetrachloride plant at Botany, New South Wales, were announced by ICIANZ a few weeks ago. The project, which will cost about £1½ million, is expected to be completed by the end of this year.

New solvent. General Chemicals Division has completed at Widnes a plant to make 1.1.1-trichloroethylene, a solvent not previously manufactured in this country. It will be sold under the trade name 'Genklene' and extends the range of non-inflammable chlorinated solvents—trichloroethylene, perchloroethylene, methylene chloride, etc.—already made by ICI.

Industrial welfare post. Mr. W. J. P. M. Garnett, head of the Communications Section of Central Labour Department, has accepted an invitation to become director of the Industrial Welfare Society.

Clydeside novel. Mr. Hugh Munro (Nobel Division) has broken fresh ground in his fourth full length book. The first three were devoted to the adventures of Clutha, the tough private eye of a Clyde shipyard. This time, in *The Clydesiders* (Macdonald, 16s.), Mr. Munro tells the story of life among shipyard workers in Glasgow between the two world wars—he was himself employed in the shipyards before the depression.

Fluey Nick

YOU cannot help thinking of *The Water Babies* when you talk to **Mr. James Nicklin,** or "Fluey Nick" as he is known at Alkali Division's Stoke Salt Works.

When Mr. Nicklin as a boy started helping his father, the local chimney sweep, it was not domestic chimneys that he used to sweep but the big horizontal flues of the open-pan sheds at Stoke Works.

When he was old enough he took a job at the Works and later became chargehand of the sawmill, where they used to

cut the elm to make moulds for block salt. But still he continued to clean the flues at the weekend. Sunday mornings he would be up at 4 o'clock to be at the Works and begin sweeping as soon as the flues were cool enough to get inside them. By lunch-time he would have cleaned eight or nine of the 28 flues, always having to crawl right inside the 3 ft. 6 in. square tunnels heavily lined with choking soot, which made him gasp for breath as he worked away with his small handbrush.

Mr. Nicklin

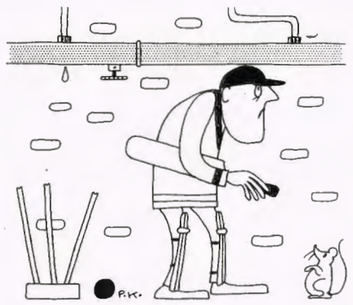
But he went on with the job of cleaning the Stoke Works flues for 50 years, right up to the time when—thanks to the modern evaporation process—there were no longer any flues to clean.

Now a remarkably youthful 77, having retired twelve years ago, pensioner Nicklin is in great demand for sweeping the domestic chimneys in the Droitwich district.

Cricket at Thames House

DENZIL Batchelor's article on Alf Gover's cricket school which appeared in the July *Magazine* has prompted Mr. Sidney Rogerson, former ICI Publicity Controller, to remind us of a similar pre-war venture on our own doorstep.

In the early thirties one of Mr. Rogerson's duties was to help find tenants for Thames House and to popularise the development of the new business area in what until then had been the near-slum of Millbank. The foundations of Thames House, sunk in caissons below the level of the river, gave it a spacious sub-basement (which now houses, among other things, ICI's Civil Defence headquarters) as well as a normal basement. It seemed likely that it would be difficult to let. Mr. Rogerson, himself a keen cricketer, was therefore doubly delighted when the



Australian Test all-rounder Alan Fairfax, rented the space for a cricket school.

To publicise his enterprise, which alas from his point of view was not a commercial success, Fairfax invited down all the top players from the counties and visiting Test players. The result was that one evening Mr. Rogerson, an enthusiastic supporter of the school, found himself batting in a net against G. O. Allen, George Kemp-Welch and Freddy Brown.

A Weight Problem

AFTER the Brussels Grand Prix last April it became evident that, if a British driver was to play any part in the world championship, weight saving in the construction of Formula 1 racing cars would be of outstanding importance. Marston Excelsior were approached and asked to build two light alloy coolant radiator/oil cooler units and Metals Division agreed to supply titanium metal to a specialist firm to enable lightweight bolts to be made to replace steel in certain suspension components.

The radiators and bolts were produced in time to be fitted to a Lotus-Climax car to be driven by Stirling Moss and entered by R. R. C. Walker in the European Grand Prix held at the Nurburgring in Germany. In spite of a strong challenge from the Ferrari team, Stirling Moss won at an average speed of 92·34 mph and was subsequently awarded the British Automobile Racing Club's gold medal for his outstanding driving performance in this race and at Monaco earlier in the season.

Although racing car applications will not result in large orders for light alloy radiators or titanium, they provide experience in meeting exacting demands, and it is hoped to extend the use of titanium to connecting rods to enable higher power at higher rpm to be achieved in a new British engine which will be used in Formula I racing this coming season.

50 Years' Service

The following employees have completed 50 years with the Company. **Alkali Division:** Mr. G. Garnett, Avenue Works (27th November); Mr. G. A. Lucas, Stoke Salt Works (21st December); Mr. G. B. Manning, Stoke Salt Works (19th December).

Appointments

Some recent appointments in ICI are: **Alkali Division:** Miss J. F. Holgate, Staff Officer (Women). **Billingham Division:** Mr. S. D. Lyon, Production Director. **General Chemicals Division:** Mr. R. B. Richards, Research Director. **Head Office:** Dr. D. S. Davies, Head of Research and Development Department and of new ICI Research Laboratory; Mr. W. A. M. Edwards, Head of Technical Department; Dr. H. G. Reid, Purchases Controller; Dr. M. A. T. Rogers, Assistant Head of Research and Development Department. **Heavy Organic Chemicals Division:** Mr. M. A. E. Hodgson, Research Director; Dr. J. W. Woolcock, Development Director (in addition to his duties as Techno-Commercial Director). **Nobel Division:** Mr. T. Forrester, Works Manager, Roburite Factory; Mr. F. G. O'Hanlon, Chief Accountant. **Plastics Division:** Mr. H. H. Tomlinson, Education Officer. **ICI (Export) Denmark:** Mr. G. J. T. Parr, Local Director and Manager.

Retirements

Some recent announcements of senior staff retirements are: **Billingham Division:** Mr. P. Mayne, Technical Director (retired 30th November). **Nobel Division:** Mr. J. M. Aiken, Chief Accountant (retired 31st December 1961); Mr. A. H. Baxter, Works Manager, Roburite Factory (retired 31st December 1961). **Plastics Division:** Dr. O. J. Walker, Education Officer (retired 31st December).

Obituaries

Mr. E. H. Austin

It is announced with deep regret that Mr. E. H. Austin, a former director of the Alkali Division, died suddenly on 21st November. Mr. Austin was appointed an Alkali Division Director in 1946 and retired at the end of 1950 after 47 years' service.

Sir B. P. Singh Roy, KCIE

It is announced with deep regret that Sir B. P. Singh Roy, KCIE, who had been a director of the Alkali and Chemical Corporation of India Ltd. since 1949, died in Calcutta on 24th November.

Mr. Joseph Wilson

It is announced with deep regret that Mr. Joseph Wilson, one of the original Directors of Scottish Agricultural Industries Ltd., died suddenly on 12th November. Mr. Wilson was a director of Charles Tennant and Co. (of Carnoustie) Ltd., one of the constituent companies of SAI. He retired from the SAI board in March 1944.

Snow – and After

By Percy Thrower

All gardeners, I think, realise how dependent we are on the weather and how it can help or hinder us with our work outside. In the autumn the soil worked well, but this month we shall be lucky if snow does not hold us up. The evergreen trees are possibly the most likely to suffer damage in heavy snow, we have seen how the weight of snow will bring down the branches of cedar, yew, cupressus and other trees which retain their green leaves through the winter. Unless we take some immediate action, the symmetrical shape of the conifers is spoiled, and hedges of this kind of tree become unshapely because the thinner branches have been brought down and in some cases broken with snow which collects on them.

Tying Back

When we see the snow beginning to build up on the flat branches of trees and collecting on the evergreen hedge, we should go round with the garden rake or a long pole shaking off the snow and relieving the branches of their weight before any permanent damage has been done. As soon as the snow has cleared it may be necessary to tie back some of the branches which have not gone back to their original position. If it appears that the branches of cupressus or privet in the hedge are not going back into shape, we must straightway push the various pieces back, and some support may be needed for the time being until the branches have strengthened again.

As the snow clears, we are cheered by the first brave little snowdrops—the chionodoxa, more commonly known as "Glory of the Snow," and the colour of the first crocus, an indication that better weather is not too far distant. It is always amazing how fresh and green the grass keeps under the snow; as the snow clears it would seem to have been growing in spite of the cold. There is no doubt that snow does protect plants. Wallflowers, for instance, will come safely through a severe spell if they are under a blanket of snow, but they get shrivelled and damaged when exposed to biting east winds. The bulbs which already have their green shoots above the soil are better for a snow covering, and it will help to keep frost out of the garden frame.

As the weather improves, one of the first jobs on the lawn as the grass and soil dry is to give it a hard brushing with a besom or broom to scatter the worm casts and brush away any dead grass. We do not see the birch twig besoms used so much these days, but they are certainly the easiest for sweeping the lawn and brushing together leaves and any other light materials. There is, I see, a besom made of whalebone which is more lasting and does a really good job.

Winter Spraying

Winter spraying of fruit trees is another of the essential jobs to be finished; an important thing to remember is that the DNC winter spray can be used up to the end of February with safety; if the weather keeps everything back it may be possible to use it into early March, that is if the buds are not too far advanced. Even when the buds are swelling and beginning to burst, thiocyanate spray can safely be used, and I would say the deadline for this is the third or fourth week in March in a normal season. This, as well as killing the eggs of aphis and red spider mite, will help to control woolly aphis or American blight as well.

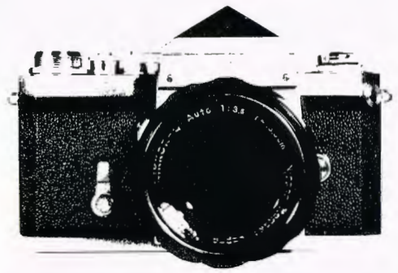
The time has come too for lifting and dividing the hardy border plants. Michaelmas daisies, with the exception of the amellus section which includes King George, I prefer to lift and divide every year. Phlox, lupins, heleniums, delphiniums, rudbeckia, etc., need dividing every third year. If the clumps are left large and unruly the flowers will be small and will not give such a lasting display. Each clump can be divided into small portions with four or six buds or shoots on each. The soil must be forked over and some peat, compost or manure worked in, because these plants in most cases will rely on this for the next three years. Bone meal, two to four ounces per square yard, can be sprinkled over the surface before replanting. This is one of the most lasting organic manures. Those borders not in need of lifting and dividing can be lightly forked over and top-dressed with bone meal followed by peat or compost.

Seeds under Glass

There are no seeds which can be sown outside this month. Seeds for early sowing at the end of this month are radish, lettuce, Short Horn carrots and salad onions, as well as round seeded peas and broad beans. For early crops I think it is better to sow peas in pots, four or five in each $3\frac{1}{2}$ inch flower pot, and broad beans one or two seeds in each. These must be kept in either a cool greenhouse or a protected garden frame. They can be planted outside in early April. In boxes seed of lettuce, Brussels sprouts and early cabbage and cauliflower can be sown. The seedlings will need to be pricked out two to three inches apart in a frame or box so that they can be gradually hardened off for planting out in April.

If a temperature of 50–55° F. can be maintained in the greenhouse, seed of begonias, salvias, antirrhinums, lobelia and petunias can be sown, but if it is not possible to maintain this temperature it would be better to put off the sowing until March.

Russian visitors. During a visit to Pharmaceuticals Division members of the Russian delegation from the State Committee for Co-ordination of Scientific Research were shown over Alderley Park Laboratories. Here Mr. K. N. Rudnov, a deputy prime minister of the Soviet Union, shows interest in a display of products



NEWS IN PICTURES

Home and Overseas

Rope trials. Mr. Bill Clewes (engineer) and Captain Jack Martin prepare to secure Alkali Division's m.v. *Marbury* alongside Wallerscote Wharf using polypropylene ropes

Salts in the kitchen. Twelve chief petty officers and petty officers who recently completed a six months' catering course at the Royal Naval Supply School, Chatham, called at Wilton a few weeks ago to see an industrial catering organisation in action

Lads v. Dads. Events during Club Week at the Billingham Synthonia Junior Club included a Lads v. Dads contest at indoor games

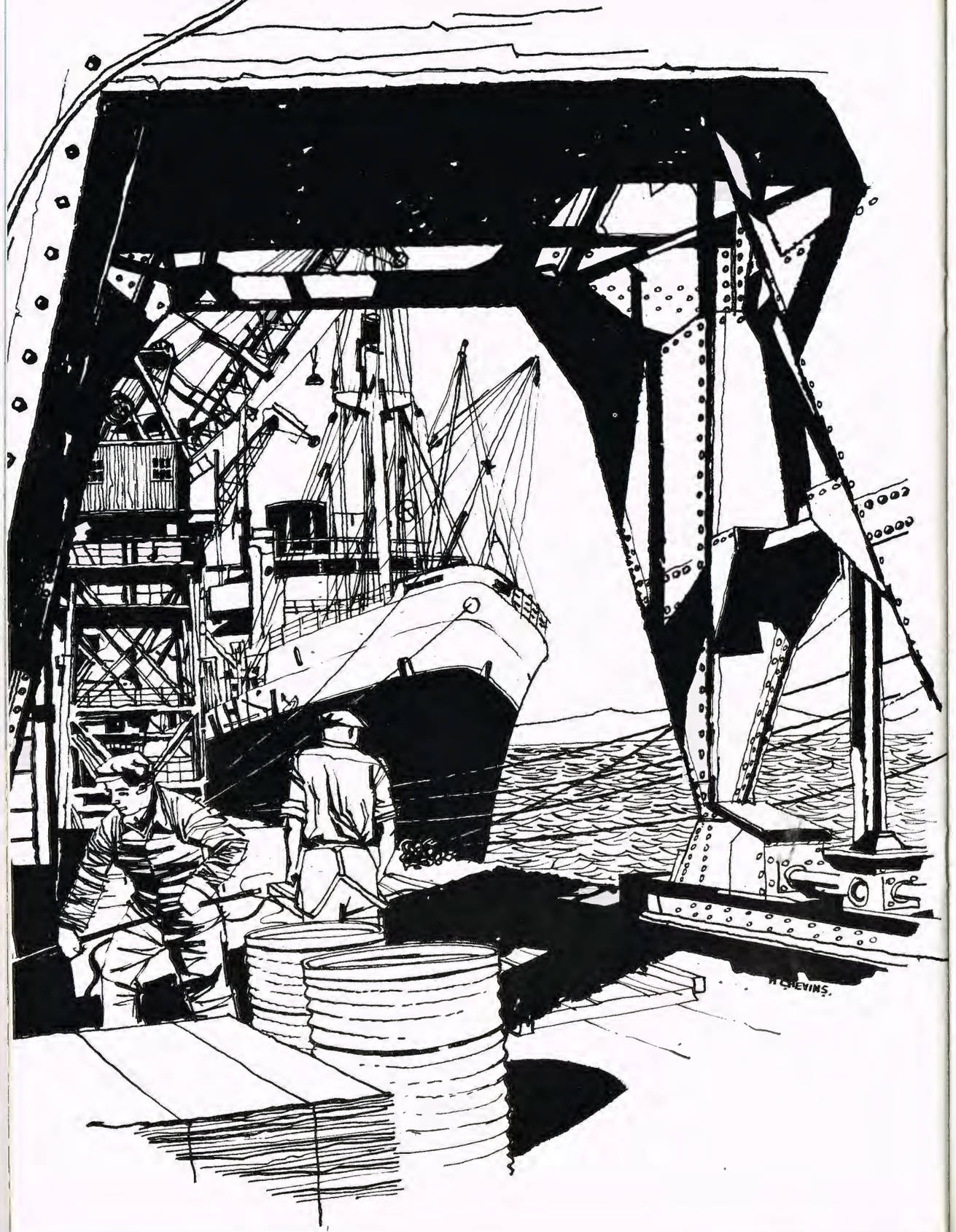
£130 award. Watched by Dr. John Gillies, works manager at Nobel Division's Dumfries Factory, Mr. Edward McShane, an assistant foreman at the factory, receives a suggestion award cheque for £130 from Dr. John Holm, chairman of the Division

Wings Club. Alkali faces are always much in evidence at the Wings Club run by the Northwich branch of the Royal Air Force Association. Of the 225 members, all ex-RAF men, about 80% are ICI personnel. ICI men here enjoying a chat and a pint are Mr. Roland Beckett (chairman of the Northwich branch of RAFA), Mr. Bill Buckley, Mr. Albert Beswick (welfare officer), Mr. Arthur Dunn and Mr. Bob Parks

St. John award. Mr. Herbert Davies (General Chemicals Division), who has been a member of the St. John Ambulance Brigade (Widnes Section) for 34 years, with the award he received for distinguished service

Narrow escape. Mr. Douglas Willis (Wilton Works) was recently involved in an accident in which his foot was trapped beneath the 5 cwt. fork of a fork-lift truck. The steel cap of the shoe he is now holding took the brunt, and Mr. Willis got away with severe bruising

Prize stand. The Magadi Soda Co. took second prize for its stand at the Royal Agricultural Society of Kenya Show last autumn. It was the Society's diamond jubilee and Magadi's golden jubilee year



Our Customers: No. 2

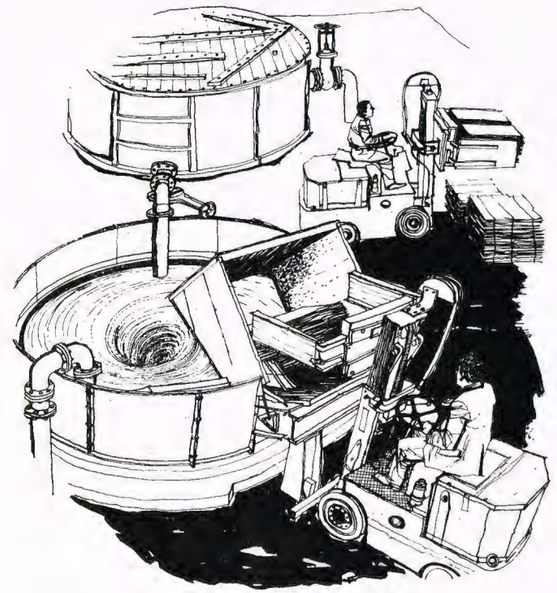
THE PAPER MAKERS

Every newspaper we read, every box of paper tissues we buy, every sheet of paper we write on owes much to ICI products. Altogether there are over 50 ICI products sold to the paper trade.

THE credit for making the world's first paper is traditionally given to a Chinese, Tsai Lin, who lived about AD 100. He is said to have made his paper from pulping fishing nets and rags. And rags, in fact, remained the main source of paper right up to the middle of the last century. Paper is a felt made of cellulose instead of wool fibres, and wood pulp is now the industry's main raw material. But rags still play an important part in the production of high-grade papers.

Wood pulp for the British paper industry comes almost entirely from the Scandinavian countries and from Canada. The cheapest form—used for newsprint—is mechanical pulp, that is, wood ground to a slurry in water, squeezed dry, and baled for export; newsprint itself is made from a mixture of this mechanical wood pulp and unbleached sulphate pulp. At a mill like Bowaters at Northfleet in Kent, bales of imported pulp are dropped into a hydrapulper, where in a whirlpool of water they disintegrate again into a liquid pulp or slurry ready for papermaking. The paper industry is an important customer for General Chemicals Division's **chlorine** and **sodium peroxide** and Dyestuffs Division's **dyestuffs** and **pigments** and **'Fluolite' CMP liquid** or **RP** (optical bleaching agents used to make white paper look even whiter, on the detergent principle). The bleaching process, incidentally, brings many headaches in its train, because most bleaching liquors are highly corrosive, so that any metal parts which come into contact with them need frequent maintenance and replacement. ICI **titanium**, however, is completely resistant to many of these aggressive liquors. It is now being used more and more in the bleaching industry, and also for making the equipment (such as heat exchangers and reaction vessels) used to produce chlorine dioxide for paper pulp bleaching.

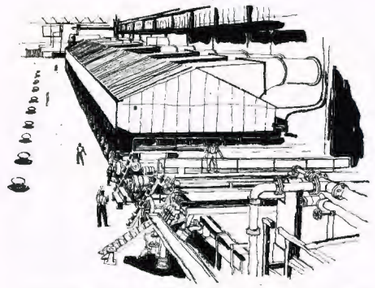
The modern papermaking machine is anything up to 400 ft. long. Fluid pulp flows in at one end and within seconds emerges as finished paper at the other. Many ICI products help to smooth its path. **'Lissatan' AC** (Dyestuffs Division) is a pitch controlling agent used to prevent the resin in the pulp forming pitch on the paper machine wires or felts. The wires,



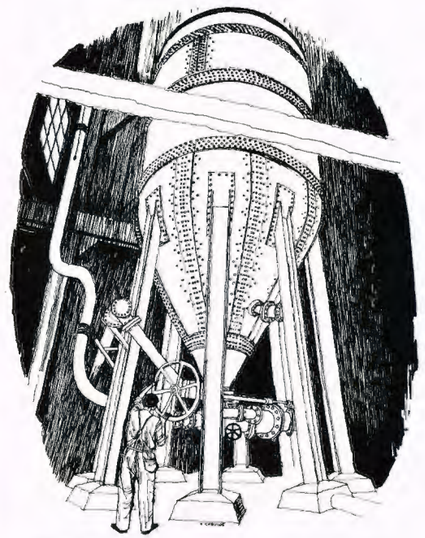
ABOVE: **A hydrapulper,** *into which bales of imported ground wood pulp are dropped. In a whirlpool of water they disintegrate into fluid pulp, ready for papermaking*

OPPOSITE: **Wood and wood pulp,** *the basic raw materials of the British paper industry, have to be imported. They come almost entirely from the Scandinavian countries and Canada*

in reality a fine gauze through which surplus water drains away, are often of **phosphor bronze**, a Metals Division product, and the felts which are used to carry this paper through the drying cylinders are in many cases these days made of **'Terylene'** because of its hard wearing quality. **'Scutamol,'** a mercurial produced by Dyestuffs Division, and **'Topane' WS** from Heavy Organic Chemicals Division help to prevent slime.



The modern paper *machine may be up to 400 ft. long. Fluid pulp flows in at one end and within a few seconds emerges as finished paper at the other. Many ICI products, including agents to control foam and slime, help to smooth the process*



Chemical pulp *is made by boiling wood chips with chemicals in a digester, which may be 40 ft. high and performs the function of a giant pressure cooker. ICI soda ash, caustic soda, sodium sulphite and liquid chlorine are used in this and subsequent processes*

The wide band of paper *which has come from the paper machine is re-reeled and cut by circular knives to the exact size suited to the customer's requirements*

Another Dyestuffs Division product, **'Siotol' AF**, and Nobel Division's **'Silcolapse' silicone** product are used to control foaming.

Chemical wood pulp, which produces a much higher grade of paper than mechanical pulp, is made by boiling wood chips with chemicals in a digester, which may be as much as 90 ft. tall and which performs the function of a giant pressure cooker. ICI **soda ash, caustic soda** and **sodium sulphite** may be used in considerable quantities in this process; subsequently the pulp is often bleached (using ICI bleach).

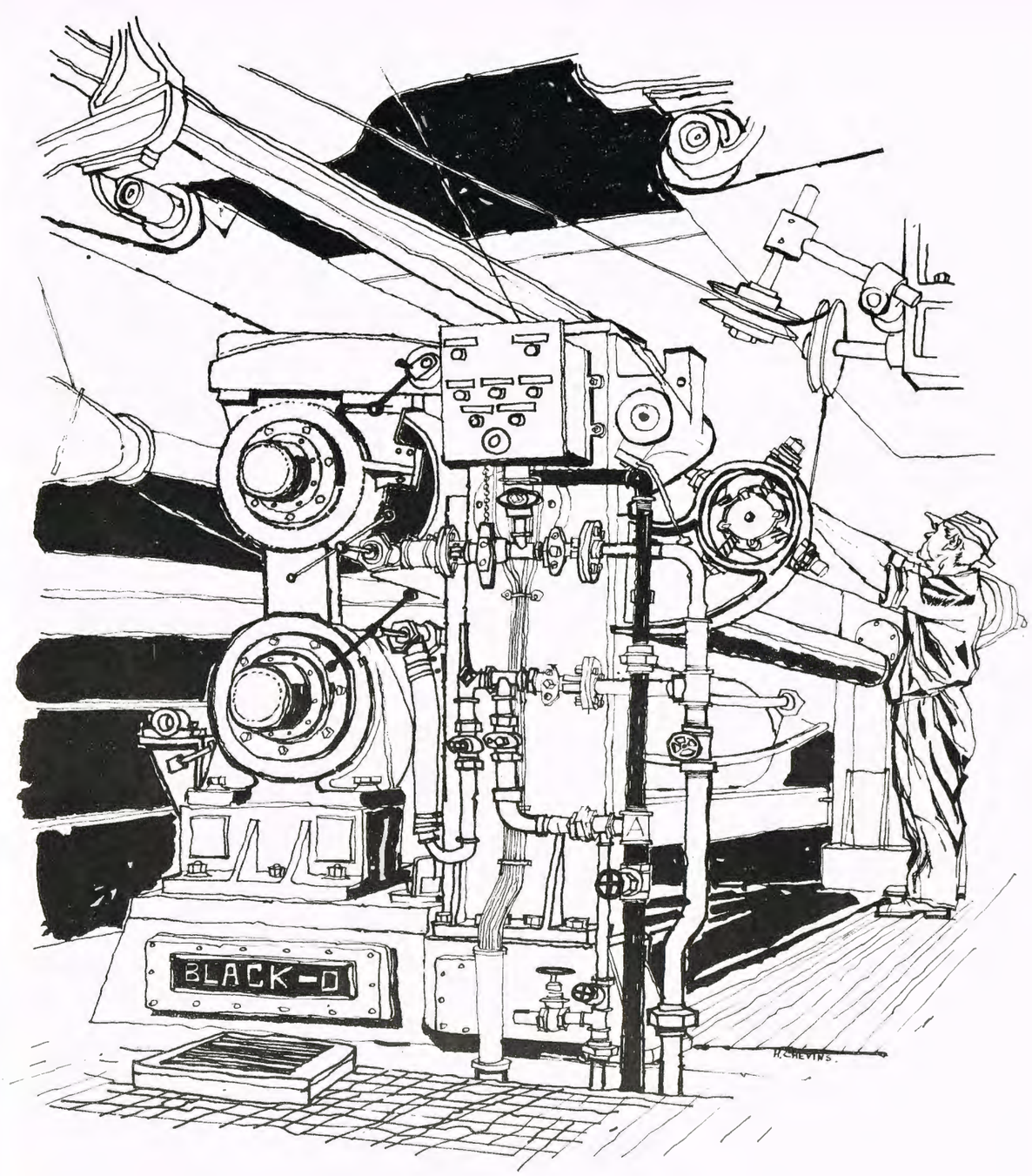
Paper from Grass

Although the great bulk of this country's paper is made from wood pulp, a small but important amount of high-quality printing paper is made from esparto grass (imported from Spain or Tunisia) or in times of scarcity, such as the last war, from straw. The cellulose is extracted from the esparto or straw by alkalis, usually **sodium carbonate** and caustic soda (Alkali Division).

Raw or untreated paper is absorbent like blotting paper. Most paper is therefore sized, using a mixture of pine rosin, emulsified with alkali, alum (**aluminium sulphate**) and sometimes **sodium aluminate**. This gives the sort of paper suitable for ordinary printing and wrapping purposes. But for higher-quality papers, such as this magazine is printed on, the paper is coated with a paint consisting of pigments like china clay, casein—a product derived from milk—and a synthetic latex like Plastics Division's **'Butakon' ML501.** This coating is similar to the distempers commonly used in household decoration. Dyestuffs Division's dyes and pigments are used to adjust the shade of the coating. The inclusion of 'Butakon' latex in the coating improves the coated paper in numerous ways, but from the printer's and reader's point of view it is the resulting improvement in print quality that counts most. For paper with a super-glossy finish, **nitrocellulose** (Nobel Division) applied as a lacquer is often used. Nobel Division also supply **'Cellofas' B,** a cellulose derivative that is an admirable sizing agent for coating boards that give brighter and more attractive packs for all sorts of products.

Coating with Polythene

Papers that need to be impervious to water vapour or water are coated with a film of polythene applied as a hot melt from an extrusion machine. This is a very large application for Plastics Division's **'Alkathene.'** There are however, many other ICI products used in small quantities for rather specialised applications. Here are just a few. Readers will, we hope, remember the sample of silicone-treated baking paper which was bound into the *Magazine* a few months ago. Another similar application for silicones is **'Silcolease,'** an anti-stick finish for backing papers for self-adhesive tapes and labels. **'Cirrasol' AC** from Dyestuffs Division is used for softening paper tissues. **'Alfloc' water treatment chemicals** are used at many mills, particularly those specialising in quality papers. From Heavy Organic Chemicals Division **'Topane' fungicides** are used to treat wrapping papers for fruit and soap, while **'Topanol' antioxidants** are used in food wraps to delay rancidity. **Sodium silicate** or water glass (Alkali Division) is used for sticking the layers of paper together in making laminated and corrugated board.



Surface treatment of papers *is becoming increasingly important. The picture shows a size press which applies starch and other materials, including ICI's 'Butakon,' to the paper's surface*

Life on a trawler

By Sydney Keers

I WAS introduced to Arthur, the mate and skipper's right-hand man. "Well," said he, following a hearty handshake, "you are in for an experience you will never forget." I was quite prepared to agree with him. All the crew were now aboard, and preparations were being made to cast off. A voice ashore queried "All right aboard ?" Skipper Fred climbed to the wheelhouse and began to call his instructions to the crew. There was a dull throbbing under my feet as the engines started, the engine-room signal rang shrilly, a confusion of shouts and the splash of ropes being cast off, and we were under way. I turned my head to port and watched the dock slowly receding. My unforgettable experience had begun.

The North Sea

We steamed away down river and soon could see the vast expanse of the North Sea ahead. I was glad to notice that it seemed calm—inviting, almost. Just off the river mouth the skipper dropped anchor to sort out his nets. I thought it was high time I knew something about my temporary home. The SS *Courtier*, I was informed, weighed 250 tons, was about 120 ft. long and "a good sea ship." Her crew consisted of the skipper, mate, third hand, two engineers, two deck-hands, two trimmers and a cook—ten in all. I made my way forward to watch the nets being sorted.

Soon we were under way again, heading east toward the fishing grounds in, thank goodness, fine weather, the white and green foam glistening in the sunlight. I was not destined to see the first trawl, however, for, though the sea was no more than choppy, I was assailed by seasickness and sought the solace of my bunk, almost regretting my impetuosity in undertaking such a trip. The feeling was heightened by the discovery that it is almost impossible to sleep on a trawler, for every three hours there is a terrific clatter from the winch. After a night's rest, however, I felt sufficiently recovered to go on deck again. I was greeted by Fred at the wheel with a cheery "How's Nelson feeling this morning ?" and a cup of hot tea, which I gratefully accepted. Hot tea, it appeared, was on tap day and night. I learned that the next haul was due in about an hour, and meanwhile Fred began to explain the mysteries of trawling.

The operation of shooting the trawl, that is lowering the net over the side, is always carried out facing the direction of the tide, and the skipper must manœuvre his ship so that the side from which the men are working is against the tide. The net itself is, of course, nothing more than a very large net bag with the mouth held open by the bobbins and the opposite end closed by a bulbous-shaped portion called the cod end. It is this cod end that is first hoisted up and dropped over the side, followed by the centre parts of the net, the cod end weights, and finally the bobbins. The bobbins are a series of floats which stop the top edge of the net from sinking right to the bottom. Finally, the otter boards, usually referred to as "the doors," since they resemble a pair of wooden doors some four feet wide and twice as long, are heaved overboard. To one end of each door is connected a corner of the net, and to the other ends are attached the winch ropes or warps. The doors are cunningly devised so that the force of water, as the trawler drives through the sea, tends to force them apart, so keeping the mouth of the net wide open.

Ploughing into the Waves

As soon as the gear is clear of the ship, the order "Full ahead" is given and the warps are let out from the winch as the trawler steams half-circle to plough her way into the waves. The length of warp let out is dependent on the sea depth—some twenty or thirty fathoms. The warps are then clamped at the stern and the trawl begins. This consists merely of steaming at full speed over that part of the sea bed where the fish are (or more accurately where everyone fervently hopes the fish are!) for the next three hours.

All this and more I learned in an hour, and the time arrived to begin hauling. Fred signalled to the engine-room, and in a trice the crew were on deck. With the exception of the cook and two engineers, all the crew fall to at hauling time. The warps were quickly knocked out of the fastenings aft, the winch roared into life with a terrific rattle and hiss of steam, and the hauling in of the net began. As the doors surfaced, the winch was stopped and the skipper turned the trawler broadside on to the net while the doors were being secured.

Hoisted Inboard

Now began the heaviest part of the job, that of hauling the body of the net bit by

bit over the side to fall in folds on the deck. After much heaving, the cod end appeared and the skipper leaned over the side to get a first glimpse of the all-important catch. Eventually, by means of the winch, the cod end, loaded with a seething, writhing mass of fish, was hoisted inboard. The third hand came forward to unfasten the cod end knot and the teeming mass of silver, white and grey, cascaded to the deck.

I took a good look at the first deep-sea fish I had seen outside the fishmonger's slab. There were quantities of the familiar cod, plaice and skate and many other kinds I was then unable to identify. The final operation, that of gutting and icing the catch, is carried on under the watchful eye of the mate, who is personally responsible for the condition of the fish. The dexterity of the crew with the knife is remarkable, and in an incredibly short space of time the whole catch had been gutted, washed, sorted, and stored on ice in the fish-room. Fish is no longer boxed on the ship, and the space formerly taken up by boxes is now used to store more fish.

The Bos'n and the Mate

The bos'n, Dusty, was a great leg-puller and irrepressible humorist—a Falstaffian character, portly and with a wicked twinkle in his eye and an enormous appetite. He had himself been a skipper but had abandoned the responsibility for the position of third hand. He was married with, I believe, a family, and his one ambition, he would have you believe, was to find a cushy shore job. Funnily enough, none of my suggestions seemed to be quite what he was looking for, and I have no doubt that Dusty will always remain a trawlerman.

Somewhat in contrast was Arthur, the mate, younger than Dusty, who took his duties rather seriously. He had been at sea many years, having served in mine-sweepers during the war, and was himself the owner of a small fishing boat. I found him very friendly and always ready with a word of explanation, advice or help. But the three-hourly routine of shooting the trawl and hauling throughout the whole trip, day and night, becomes very monotonous and means that the longest spell of sleep for any of the crew is about two and a half hours.

The weather for the first few days had

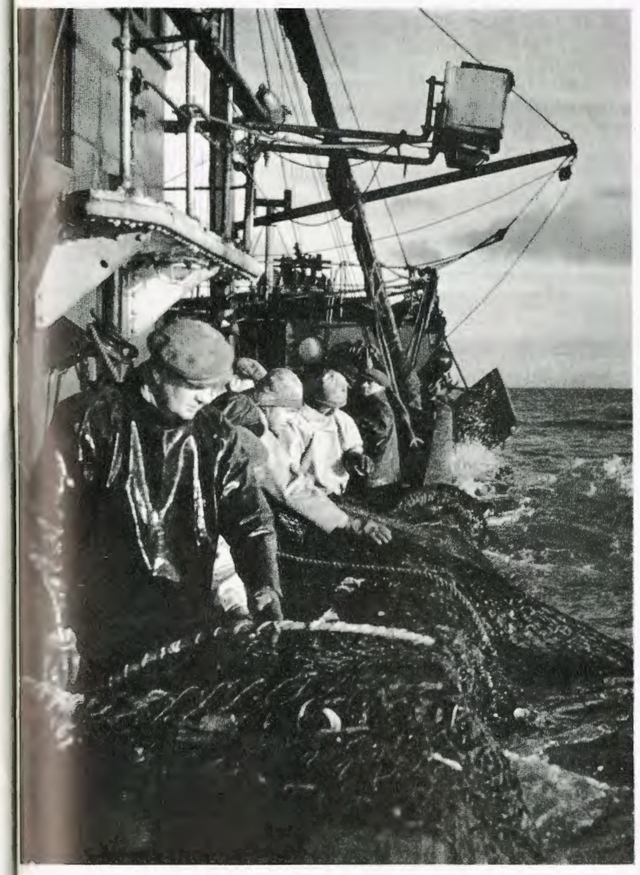
Seas break *over the side as the trawl comes in*

been good, so good that Fred was constrained to remark "I was hoping that you had been able to see us working in a gale." Later, the weather turned bad. I flashed Fred a sickly grin and stumbled below to the comparative comfort of my bunk. I was very sick. The rough weather continued throughout the day, with crew working on, shooting and hauling, shooting and hauling, the whole time. When I later reappeared, I ventured to remark that I had not enjoyed the gale overmuch. "Gale?" roared Fred. "That was just a bit of a squall!" I thought I could see his tongue in his cheek!

Throughout the trip Fred had been in contact by radio with the shore and his fellow skippers. News was exchanged about the state of the market, the catches and, of course, the weather. On the Friday, orders came to return home. Fred appeared at tea clean shaven, and the crew well knew what that signified. There was a feeling of elation in the air at the prospect of home, and even I became infected. A new kind of activity became apparent. Nets were stored away, the doors drawn up, fish pounds dismantled, decks scrubbed and cleaned. I polished the brass in the wheelhouse while skipper Fred mopped the floors. By now we were making full speed for Grimsby, the weather was fine and sunny, and it felt good to be alive. By Saturday evening we were approaching the pilot cutter moored at the mouth of the Humber, and I was delighted to find my uncle, Pilot Alf Taylor, on duty. We were able to exchange news and say our last good-byes before steaming up towards Grimsby to await high water. As we rode at anchor waiting to dock, the crew took the opportunity to spruce up and, myself included, rid ourselves of ten days' growth of beard, for I had neither shaved nor taken off my clothes during the whole trip.

Now for a few casual afterthoughts. There is no doubt that trawlermen are very superstitious. Fred, the skipper of the *Courtier* reprimanded me for whistling in the wheelhouse—"Bad luck," he said. During a tour of the deck when fishing was slack, Fred pointed out a basket hoisted aloft on the foremast and explained that the purpose of the basket was to warn all shipping that the trawler was towing. He asked me to lower the basket and re-hoist it and muttered that it might change our luck. Other superstitions I heard about include the skipper who refused to have white-handled knives on board, another who detested sailing on Fridays, and a great number who shuddered at the thought of animals.

Fishermen are tremendous eaters, and one would suspect that while at sea, surrounded by fish in raw and cooked state, they would tire of eating it. This is not the case—the third hand was always



The trawl net *being hauled in*

The cod end *of the net discharges the catch*

urging me to eat more and loudly proclaimed the good it would do for me.

As far as wages and the payment of them are concerned, the system is different from that found in most other industries. The skipper and mate of a trawler have no basic wage at all. Their pay depends entirely on the profit made on the catch. Both are cost conscious, and because of this they try to reduce the expense of the trip to a minimum. The cost of running the ship must be met before earnings begin, and the trip must be a success or they will find themselves in debt to the owning company when they reach home. While they are at sea their families must be fed, and for this purpose the mate and skipper draw money on loan from the trawler company each week, and the amount loaned is deducted from their shares at the final reckoning when the trip is complete.

The other members of the crew do have a basic wage. In addition they receive a bonus which is a percentage on the gross takings; the percentage each man receives is in accordance with his position on board—third hand, engineer or deckhand. So the fishermen, too, are concerned with the quantity and quality of the catch as well as the price the fish makes at the sale.

The trawlermen's wives go along to the company office each week their husbands are away to collect the wage and so keep the home going. They go to the dock offices each Friday and take part in the "Fish Dock Races," as pay day is usually called.

Trawlermen provide all their own personal equipment, gutting gloves, oil frocks, seaboots, sou'westers, three or four knives, guernseys and seaboot stockings, the annual cost of which may be as much as £100. A single man can, however, earn quite a lot of money during a year, and if he is ambitious can train for the post of skipper. The task is arduous and he must first graduate to third hand, then mate, and finally take the skipper's ticket.

There is a somewhat erroneous idea among the general public that the words "drunkenness" and "fisherman" are synonymous. Naturally, after long periods at sea, many trawlermen do try to make up for lost time as soon as the pubs open at 10 a.m. In actual fact they cannot make up for lost time, and as trawlers are docking daily the pubs always seem full of fishermen, and sometimes they literally take over the pub.

On the whole a fisherman does not drink more over the year than most "two-pints-a-night" citizens. But on shore they will live like kings and occasionally hire a taxi to Louth, Scunthorpe or Cleethorpes and drive to a pub, leaving the taxi outside for hours at a stretch.

The Fabulous Oasis

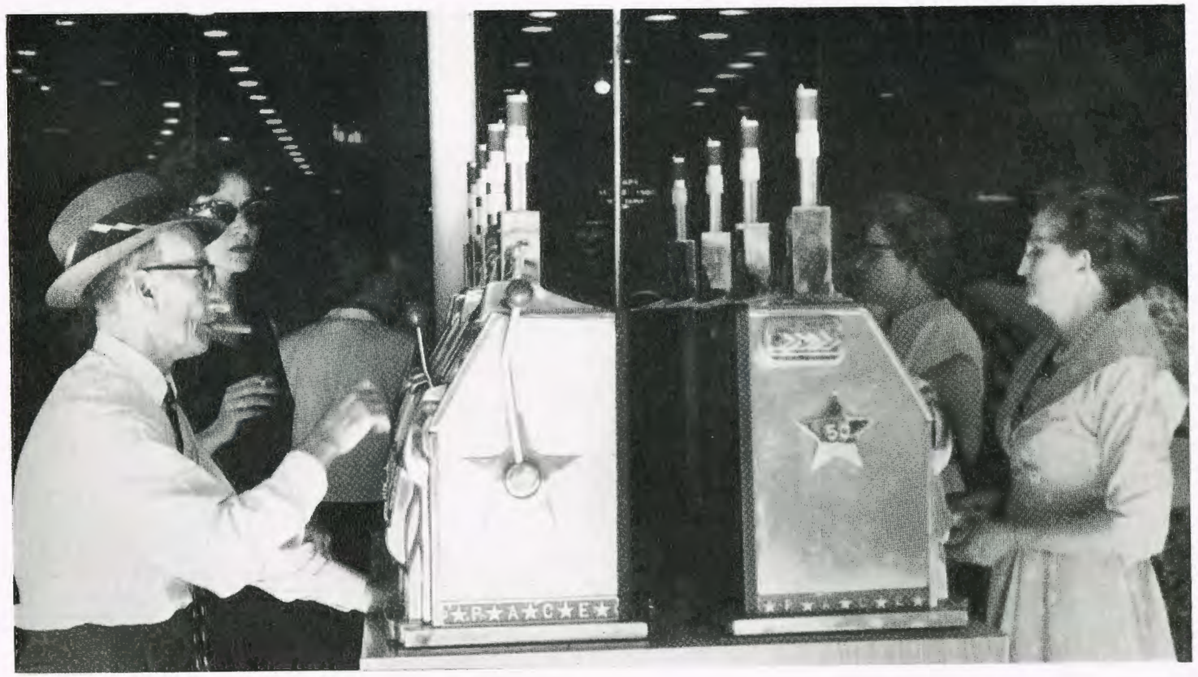
By Kenneth D. Wadsworth

IN a continent notable for its contrasts, both natural and man-made, perhaps one of the most remarkable of the former is that the highest and lowest points of the United States, Mount Whitney (14,500 feet *above* sea level) and Death Valley (280 feet *below* sea level) are both to be found within the State of California within a hundred miles of each other. Barely a hundred miles to the east of Death Valley is perhaps not the least remarkable of the man-made contrasts—the city of Las Vegas, Nevada.

Here, apparently growing in the middle of the desert, is the most lavish concentration of the entertainment industry to be found anywhere on the earth. In the short space of a decade something like $150–200 million was spent in constructing hotels, motels, casinos, restaurants and shops devoted to the needs of nearly four million vacationers each year. Yet, if one were to venture out of the back door of one of the multi-million dollar hotels lining "The Strip"—the six miles of highway connecting the airport with the downtown area of Las Vegas—one would literally be treading desert sand. This is truly an oasis, and indeed a fabulous one!

The meadows, from which Las Vegas derives its name, were known to the sixteenth-century pioneers who forced through the wilderness the Old Spanish Trail between Sante Fé and the California missions. The first permanent settlement was in 1855, when a band of thirty Mormons was sent by their famous leader, Brigham Young, "to build a fort to protect immigrants and the US Mail from the Indians and to teach the latter how to raise corn, wheat, potatoes, squash and melons." But the local Paiutes proved particularly unadaptable to civilised ways, and after a series of destructive raids even the Mormons had to give up and retire to Salt Lake City. It is said that another factor in the Mormon abdication was their failure to smelt "the abundant quantities of lead" which they found in the area. It was only later that they discovered why the metal could not be cast—it was not lead, but rich silver ore!

After the Mormon departure, agriculture and gold and silver



"One-armed bandits," *with stakes ranging from five cents to a dollar*

mining gradually developed in the area, and by 1930 the population of Las Vegas had only just exceeded 5000. Events began to move more rapidly in the thirties following the construction, 15 miles to the south-west, of the mighty Hoover (now Boulder) Dam on the Colorado River, which created Lake Mead. The hydroelectric power from this project was used during the war in the manufacture of magnesium. But it was a development of quite a different kind which started in 1946 with the opening of the $6 million Flamingo Hotel. Today more than a dozen luxurious hotels offer exquisitely furnished and appointed rooms, first-class food and entertainment—*and* gambling on almost every game of chance which has ever been invented.

Value for Money

At any of these, an air-conditioned room with private bath can be had for $10–15 per day—no more than one pays for a room in a first- or second-class hotel anywhere in the US (and certainly no more in real terms than is exacted for the faded Victorian elegance which is still the common feature of most British hotels). The casinos in the hotels offer one the choice of "blackjack" (pontoon), roulette, baccarat, "craps" (dice), "keno" (a mechanised bingo), poker and, of course, the "one-armed bandits" among other games of chance. In downtown Las Vegas, at least a dozen casinos offer similar opportunities of getting rich quick. In the dining rooms of the hotels are staged the most spectacular shows of international standard. For the price of cocktails and a good dinner—which is far from inflated by comparison with the restaurants of New York, Chicago or Los Angeles—one may see "The Lido of Paris," the Folies Bergère or a Broadway-type production of "Destry Rides Again," "The Pajama Game" or "Gypsy," or one-man shows by such favourites as Frank Sinatra, Eleanor Powell, Eddie Fisher, Sammy Davis, Mitzi Gaynor, and a host of other first-rank stars.

You may wonder how such lavishness can pay until you realise that the dining room is always strategically placed so that it can only be approached or left through the casino! Who can resist the temptation to tarry for a while, since "surely tonight Lady Luck must smile." To entice the customer in their direction each hotel strives to provide yet more famous stars and more elaborate productions than its neighbours. Some of the stages are equipped with all manner of innovations, such as revolving sets, disappearing ice rinks, waterfalls and so forth.

No less fantastic are the neon lights and other signs with which the hotels and casinos advertise their existence. Blackpool in the illuminations season seems by comparison to belong to the Dark Ages! The illustration on the previous page shows a few of the signs which have earned for Fremont Street, the principal downtown street, the title of "The World's Brightest Skyline" and "The Great White Way of the West." The display announcing the reopening of the recently remodelled Horseshoe Hotel is reported to have cost more than $800,000. Another sign on one of the highways into Las Vegas is 60 ft. tall, has 8 ft. high letters, and 4000 scintillating bulbs.

Strictly Controlled

But what of the "gambling hells"? Contrary to what you may have imagined, Las Vegas is not the "home from home" for the ex-gangsters and mobsters of Chicago, and the gaming is strictly controlled by state agencies in the interest of a fair deal for the visitor and the industry. For even the slightest infraction of the rules the gaming licence of an hotel or casino can be revoked, and this would result in the ending of all revenue on

The more affluent *are found at the baccarat and roulette tables*

these multi-million dollar investments. One of the agencies concerned employs many experienced plain-clothes investigators who circulate among the players and, unknown to the managements, watch the play 24 hours a day. The writer was told that there have been very few cases of licences being revoked. The cynic, or those whose picture of the US is derived only from Hollywood, will no doubt regard this as conclusive evidence that everyone is "squared." But a more probable explanation is that the hotel and casino managements scrupulously keep to the rules because of the dire consequences of being found departing from them in the most minute detail. Incidentally the board which considers all applications for licences consists of a former FBI man, a former Clerk of the State Supreme Court, and a retired sheriff of many years' experience.

No Concealment

The State itself has an interest in preserving the good name of Las Vegas by its strict rules and rigid enforcement of them because the tax of between 3% and 5⅛% on gambling revenues is the greater part of its income. The games are, of course, carefully adjusted so that, on average, the casino obtains a steady return on its capital—what industry can survive without? But there is no concealment of the odds, and in fact many casinos hand out to their visitors a booklet explaining the games and giving at least elementary advice on how best to "play the percentages." The vast majority of players are, of course, losers, but few are heard to lament their losses and even fewer complain that they did not get a fair return for their money in the thrill and excitement of the play. A small number are winners, some of large sums, running into tens or even hundreds of thousands of dollars.

Undoubtedly the legalisation of gambling in Nevada in 1931 —after it had been outlawed in the twenties—is the principal reason for the remarkable growth of the last 15 years. But also of importance is a glorious climate all the year round. For five out of every six hours of daylight the sun shines in Las Vegas. The temperature rarely exceeds 85° or falls below 45° F., and the annual rainfall averages 3½ inches!

Few of the resorts of the US are the exclusive preserve of the wealthy, and certainly not even the US has enough millionaires to produce an adequate return on the colossal investment in Las Vegas if the prices were such as to exclude those of lesser wealth. In its 13,000 hotel and motel rooms, Las Vegas accommodated during 1960 nearly two million visitors each staying an average of four nights. Their daily spending, exclusive of gambling losses, works out at about $17 each per day, which is the equivalent of a Britisher spending, not £6, but more realistically, not more than £3. In addition, a similar number of people visited Las Vegas without staying overnight (or, if they did, without going to bed, which is not improbable!), and they spent about $5 each, apart from gambling. The average visitor appears to lose about $10 a day in gambling—little more than the equivalent of what many people in Britain might spend in a day at the races or on a weekly pools coupon.

Wide Income Range

The number of visitors and their expenditure make it clear that Las Vegas is not just a playground of the rich. Its visitors come from a wide range of income groups, including the more modest ones. While the more affluent will be found at the baccarat and roulette tables, where the opening stakes are to be reckoned in dollars, those less well breeched can try their luck on the "one-armed bandits" at anything from a nickel (5c.) up to a shining silver dollar, minted only in Nevada, a time.

View of Whitby, Yorkshire. *Photo by A. Walker (Billingham Division)*